

The Elements Unearthed: Teaching the History of Chemistry Through Student-Created Podcasts

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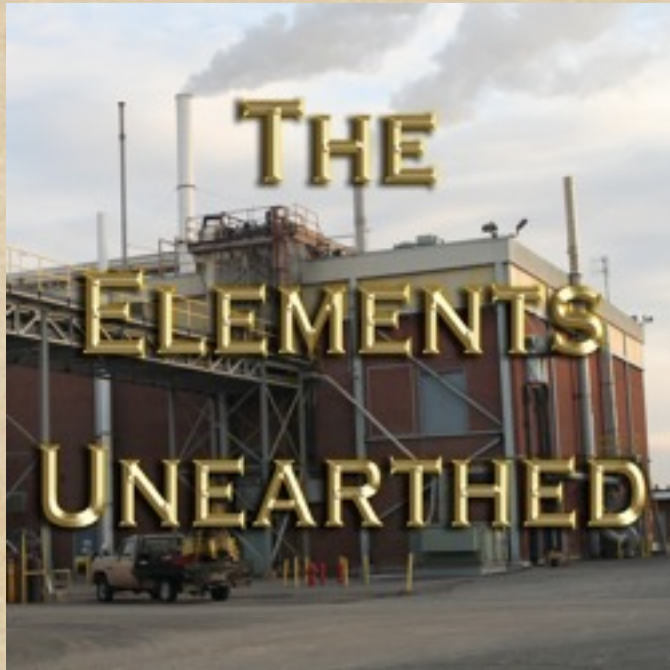


Project Description

- ◆ Document the history, sources, uses, mining, refining, and hazards of the chemical elements and industrial materials; show scientists on the job.
- ◆ Teams of students and community members trained to document their local history using digital video technologies; Subject Experts as advisors.
- ◆ Footage edited into a series of video podcast episodes uploaded to aggregate sites (YouTube, iTunes, etc.) and available to everyone.
- ◆ Target Audience: First year chemistry students (high school or college).



What is Podcasting?



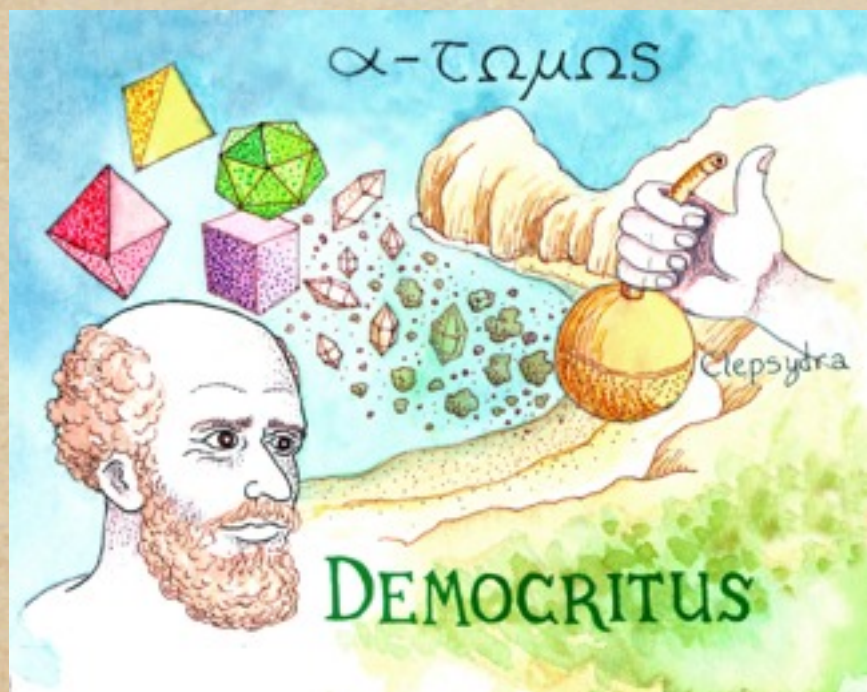
- ◆ Four types: Audio, Enhanced Audio, Video, and PDF.
- ◆ Easily created using Garageband, iMovie, Soundbooth, or other programs. Anyone can make them, even students.
- ◆ Metadata (search tags, description and info. fields, etc.) added in iTunes or Podcast Maker.
- ◆ Self-published through an RSS feed from your website or blog to the Apple iTunes site and other aggregators.
- ◆ Available for free any time, anywhere, for anyone. New episodes automatically update in iTunes.

Phases of the Project:

- ◆ Phase I: Proof-of-Concept (2007-09). Development of process and creation of several sample episodes at MATC.
- ◆ Phase II: Prototype Development (2009-2011). First episodes deployed; background research at CHF; recruitment of teams for Utah, then neighboring states; training in person; collaboration with Subject Matter Experts.
- ◆ Phase III: Full-Scale Project (2011-2014). Open to all states, with training online. Teams collaborate to ensure quality.
- ◆ Phase IV: Ancillary Materials (2012-2015). Posters, website, games, video series, book, lesson plans, etc.

Chemical Heritage Foundation Fellowship

Sponsored by Société de Chimie Industrielle
(American Section)



- ◆ Three months - Summer, 2009.
- ◆ Acquire or create images and background history that teams won't have access to.
- ◆ Three areas: Beginnings of atomic theory in Greece, revival of atomic theory in 17th Century, alchemical laboratories and equipment (3D).

How You Can Help

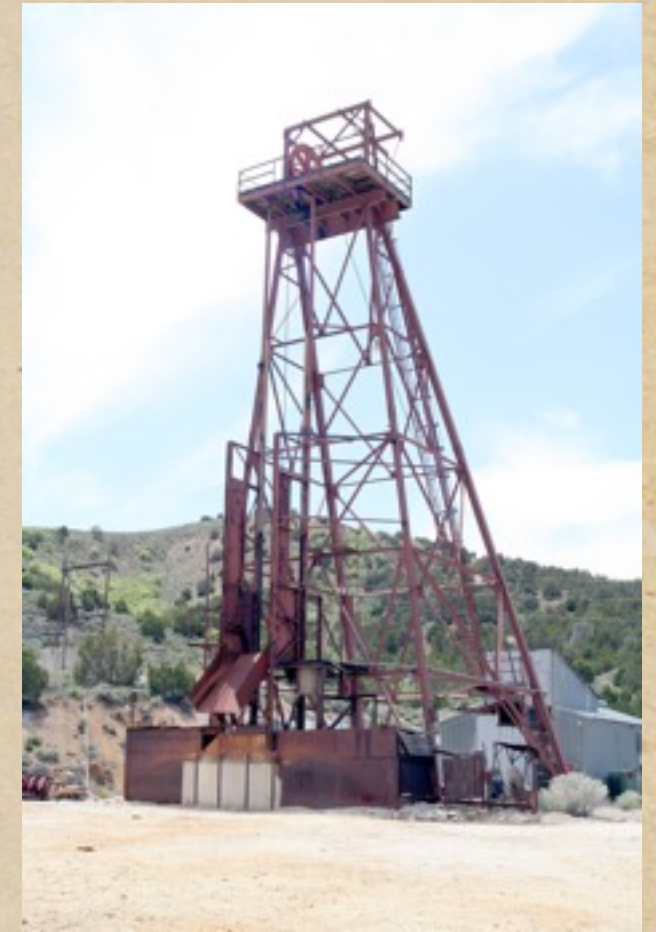
- ◆ Teachers can mentor teams of their own students, find local sites to document, and work with Subject Matter Experts. The teams will be trained in project planning, script writing, digital video/photography techniques, and editing software.
- ◆ Teachers and students can also help test and evaluate the scripts and episodes available through a central Wiki site (elementsunearthed.pbwiki.com) and use evaluation instruments available from our blog site (elementsunearthed.com).
- ◆ Chemical industrial sites, museums, research libraries, etc. can help sponsor a team and provide Subject Experts.
- ◆ Professional organizations can provide grant funding and act as part of the Advisory Board.
- ◆ Anyone can follow the blog, make comments, download episodes and PDF files, and use them (Creative Commons 3.0).

Samples of Phase I: 2007-2008

- ◆ Cement Manufacturing
- ◆ Beryllium Refining
- ◆ Tintic Mining District

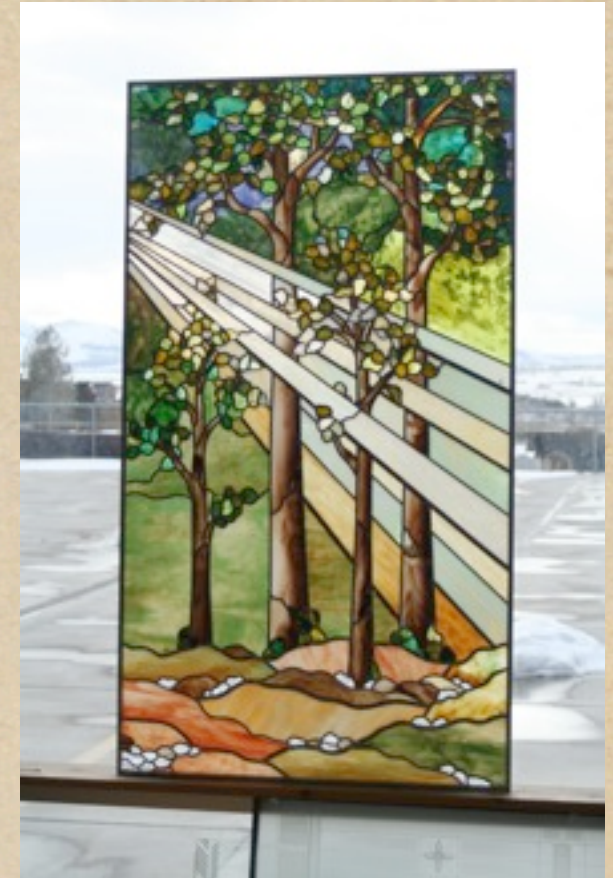


Samples of Phase I: 2007-2008



Samples of Phase I: 2008-2009

- ◆ Glass Blowing
- ◆ Stained Glass
- ◆ Tintic Mining Museum
- ◆ Synthetic Diamonds



Stained Glass



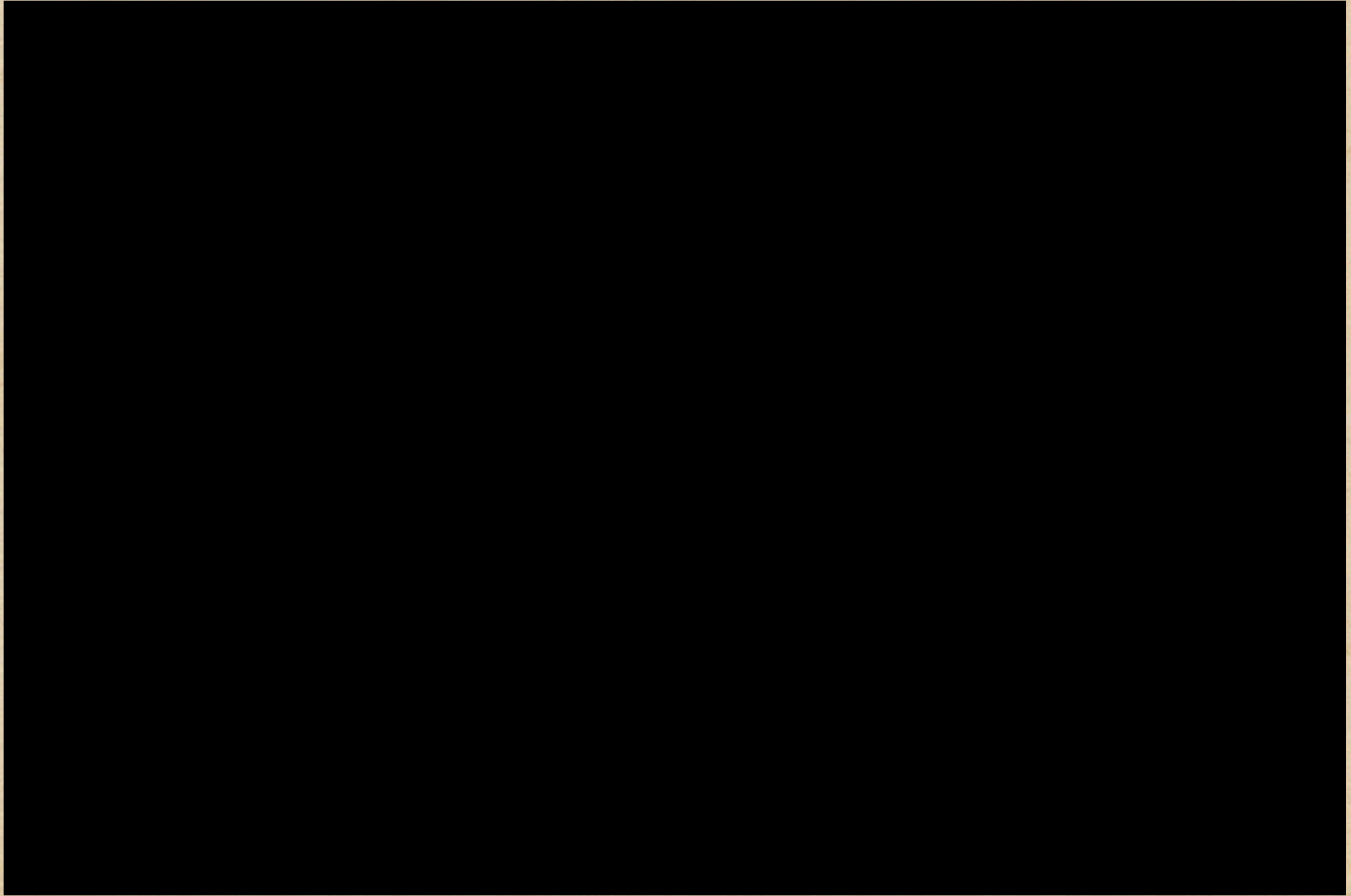
Tintic Mining Museum



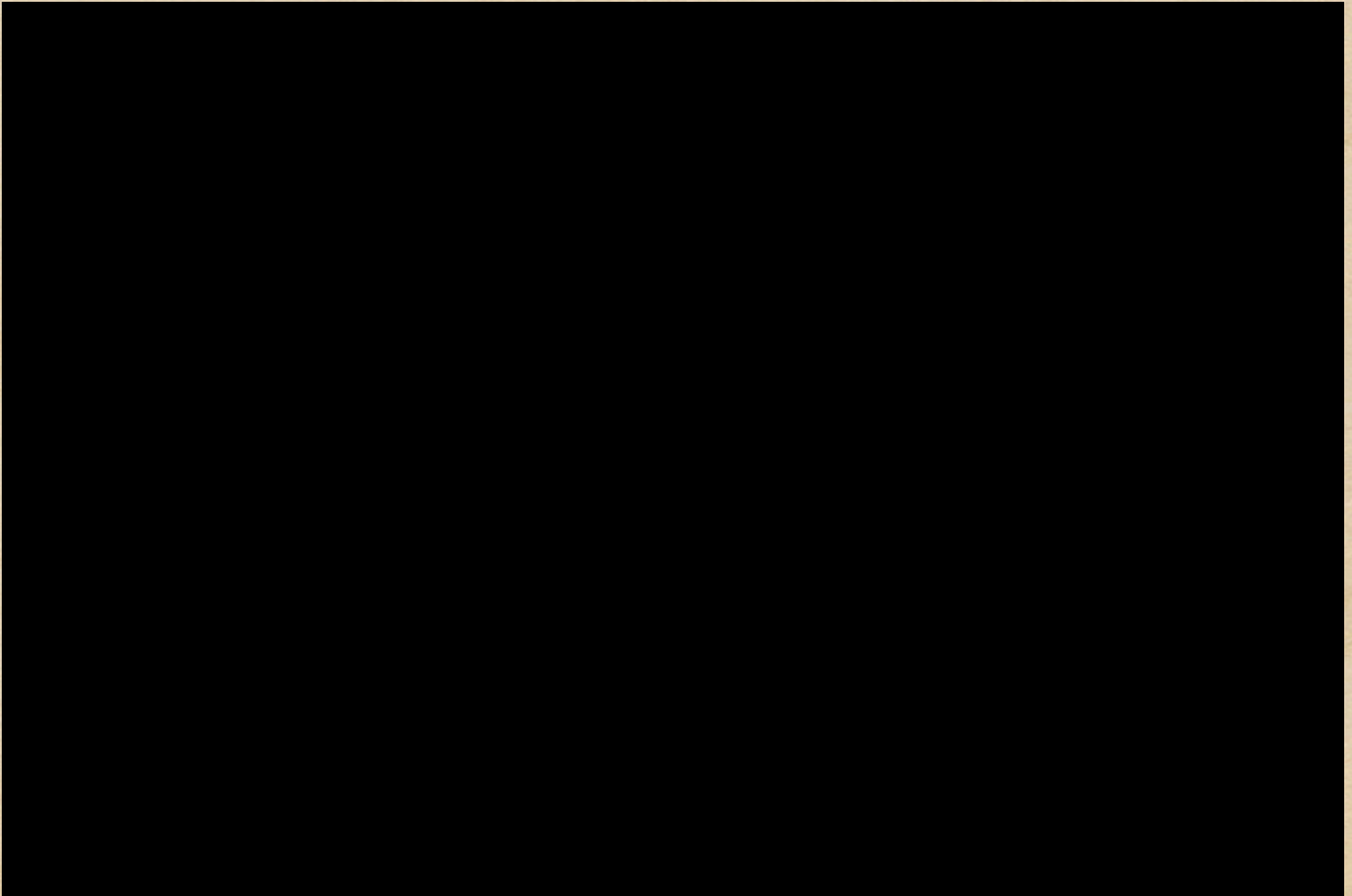
Synthetic Diamonds: Novatek



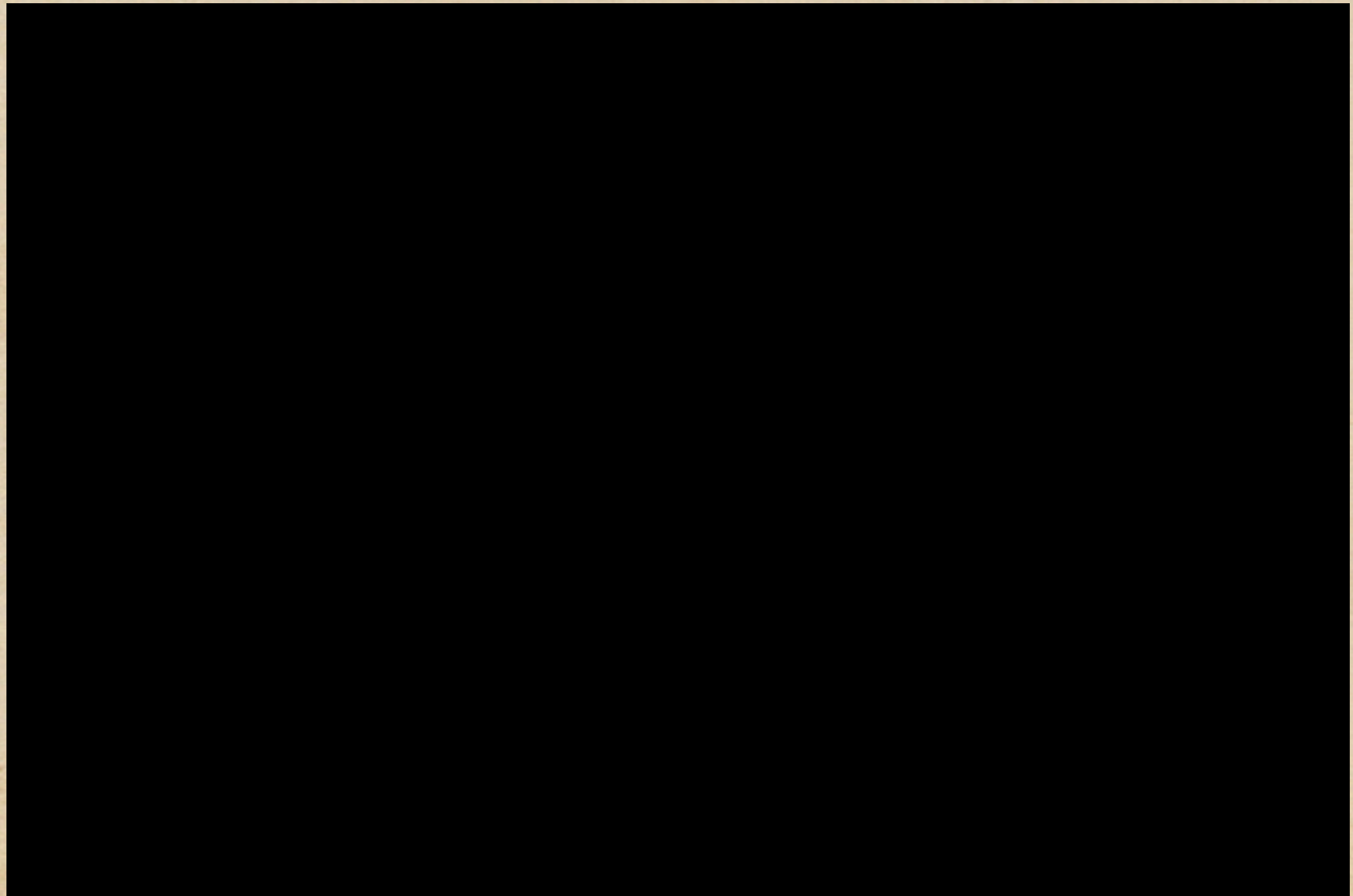
Video Samples: Glass Blowing



Invention of Synthetic Diamonds



Sample Animations for CHF Fellowship: Empedocles & Aristotle



Project Rationale:

Four Needs

- ◆ To protect lives
- ◆ To preserve the past
- ◆ To ensure the future
- ◆ To promote STEM careers



Val Roberts, a 37-year old Deseret farmer, | to build home, but cannot get federal loan
kneels beside well he drilled where he wants | because well exceeds set arsenic standards.

By Vern Anderson
Associated Press Writer

DESERET, Millard County — Val Roberts is puzzled because the federal government says it can't give him a loan to build a house since there's too much arsenic in his well water.

He's confused, says Roberts, because the arsenic level in nearby Hinckley is higher than in Deseret, although folks in Hinckley can get the same type loan he wants.

Roberts said the root of the problem is "regulatory agencies enforcing arbitrary rules regardless of how it affects you."

"I don't think it's right," said the 37-year-old father of six.

"If arsenic is really harmful to us then we don't want to drink it. But we don't think it is."

Twice Level

The Farmers Home Administration says the water in Roberts' well contains arsenic at a level just over 50 parts per billion — twice the level of 25 parts permitted by the state and the Environmental Protection Agency. Arsenic is a heavy

Arsenic Ruling Upsets Millard Area

metal that can be fatal in much higher doses.

Hinckley has a central water system built in 1968 with state Division of Health approval. Tests of the water a few years later — the first to be run — showed arsenic levels of about 200 parts per billion, or four times the standard set by EPA.

Loans Approved

Gayle Smith, state Bureau of Water Works director, said building loans are being approved in Hinckley because the state has given the

town's water system a "classification pending" rating while awaiting results of an EPA-funded study of arsenic and its effects on area residents. The two-year study will be completed early next year.

Unless EPA allows state officials to grant a variance, Smith said, "It's just a matter of time before we'll have to rate the water system in Hinckley as not approved." Last year, the National Science Foundation recommended EPA not relax its arsenic standard.

Residents in Doubt

Many Deseret and Hinckley residents doubt there is a health hazard. They point to residents in their 80s who apparently are in robust health after years of drinking the water.

"I guess everybody hears that word — arsenic — and says, 'Aha! Poison!' But we're talking about low amounts," said one state health official.

The Hinckley-Deseret area of Millard County is the only one in Utah where the water — percolating through geologic formations — picks up appreciable amounts of arsenic.

STEM Career Stats

PISA 2006 Science Literacy



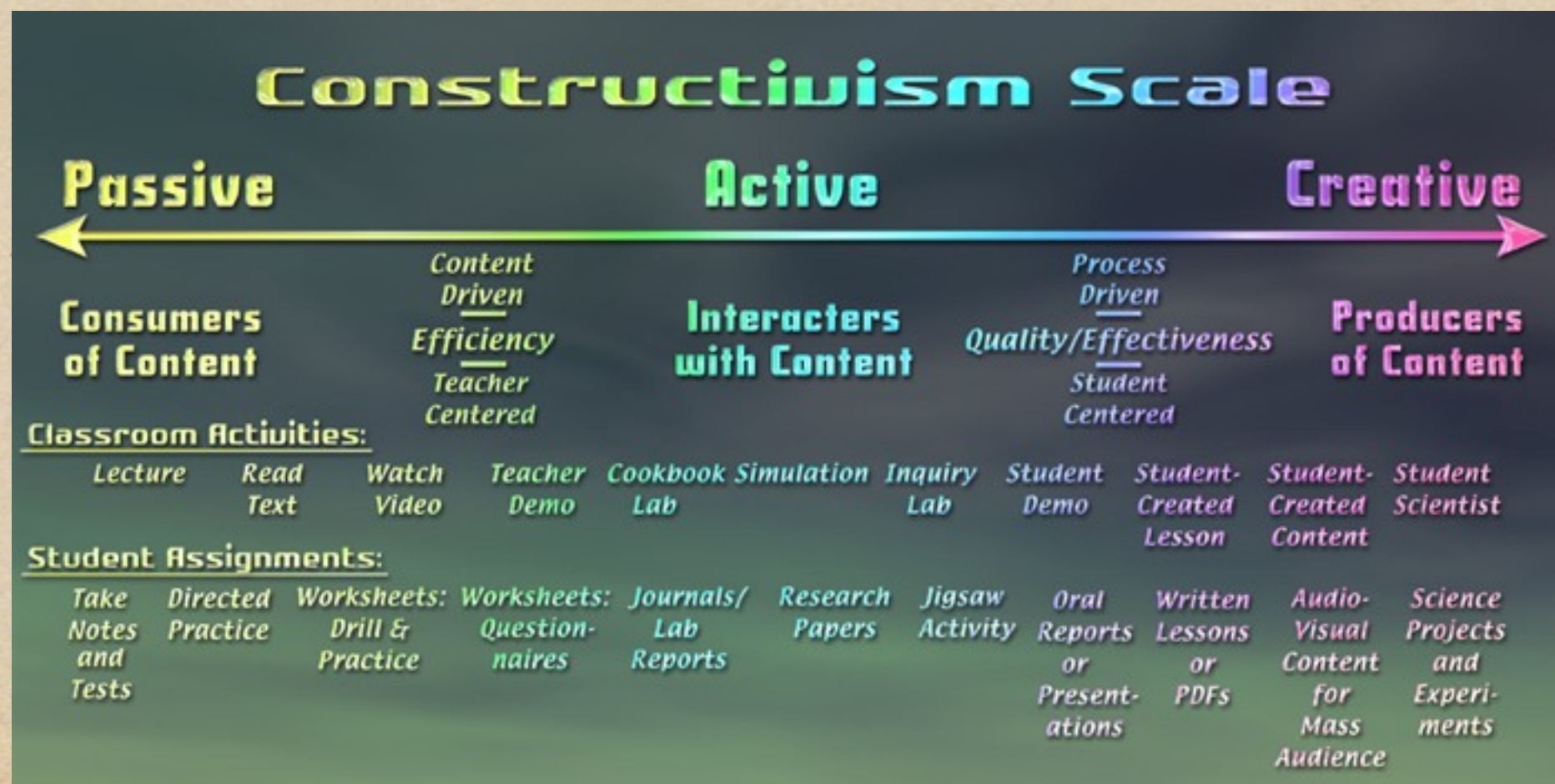
STEM Career Stats

Science &
Engineering
Degrees:
1966 - 2004



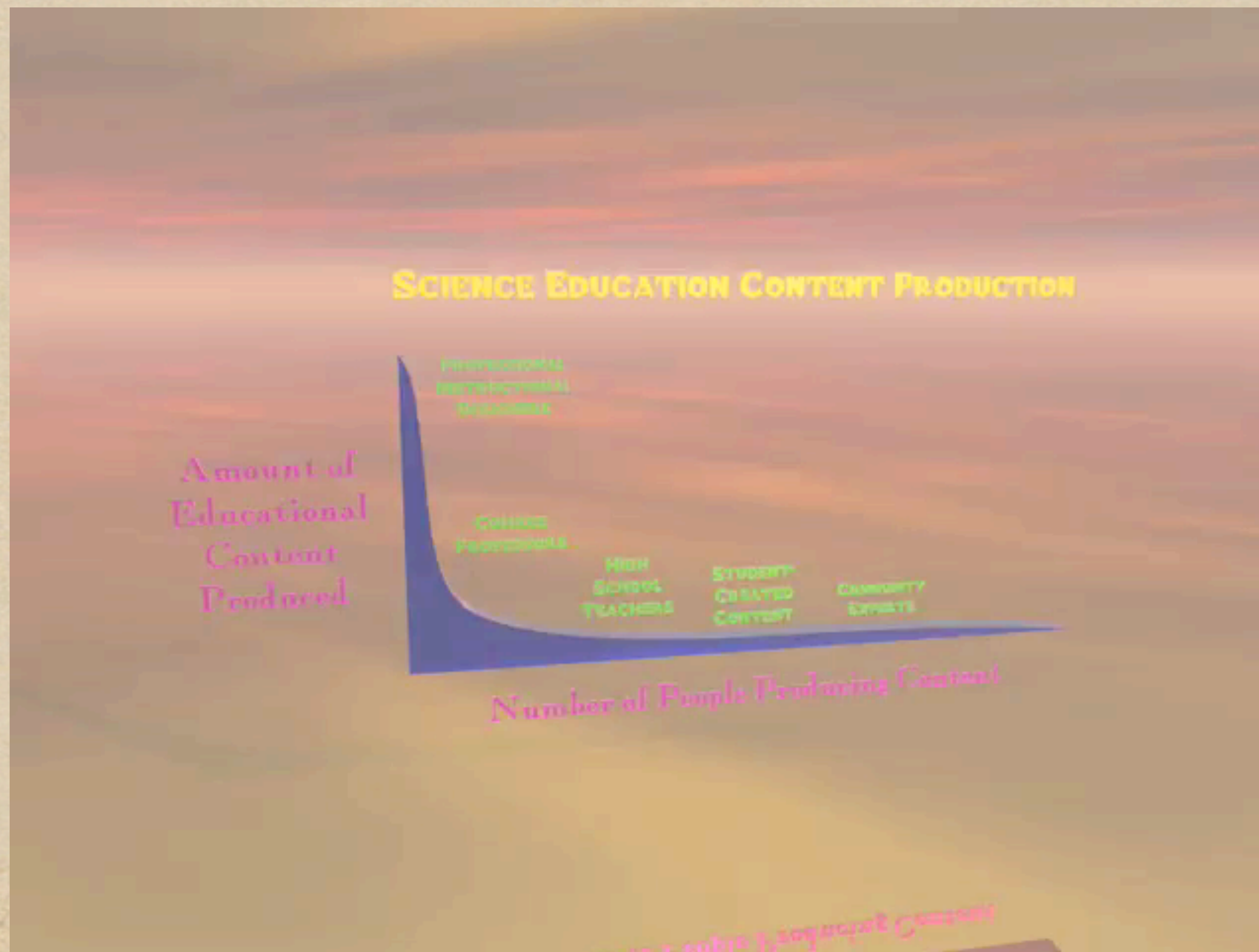
Project Rationale: Beyond Hands-On

- ◆ Value of student-created content
- ◆ Producers instead of consumers
- ◆ The Creative Student: student scientists



Project Rationale: Podcasting

The Long Tail of Science Education Content Creation



Project Rationale: Globalization & the Economics of Abundance

- ◆ Ten forces that have flattened the world
(Tom Friedman: The World is Flat)
- ◆ The digitization of everything
- ◆ Unbounded audience
- ◆ Information on-demand anywhere
- ◆ Web 2.0 technologies



Benefits to Your Students (and to you)

- ◆ Explore Web 2.0 technologies, including Wikis, blogs, and podcasting.
- ◆ Learn media design skills & software, including Adobe Photoshop & Apple Final Cut Studio.
- ◆ Develop skills in photography & videography using digital cameras & video equipment.
- ◆ Document the history of science in your area and promote your community.
- ◆ Collaborate with other schools on a national project.

Qualifications of Teams:

- ◆ Four to six students, blend of science, history, media, and /or art. Must be 9-11 grade.
- ◆ Have access to nearby sites that are related to the elements, chemicals, materials, or energy.
- ◆ Schools or students have computers with appropriate software (Adobe CS, Apple Final Cut, or Adobe Premiere). Cameras will be provided.
- ◆ Preference given to rural/underserved schools.